UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,917	09/17/2003	Kouji Kataoka	16869G-086500US	7065

20350 7590 03/06/2007

TOWNSEND AND TOWNSEND AND CREW, LLP
TWO EMBARCADERO CENTER
EIGHTH FLOOR
SAN FRANCISCO, CA 94111-3834

EXAMINER	
RENNER, CRAIG A	
ART UNIT	PAPER NUMBER
2627	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/06/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/665,917	KATAOKA, KOUJI	
	Examiner	Art Unit	
	Craig A. Renner	2627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 February 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) *7-16* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,17 and 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 23 February 2007 has been entered.

Election/Restrictions

2. Claims 7-16 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to one or more non-elected inventions/species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 19 December 2005.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-6 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (US 6,383,574).

With respect to claims 1-6 and 17-18, Han teaches a composite magnetic head comprising a magnetoresistive head (FIG. 4, for instance) comprising a lower magnetic shield (at least a portion of 10, see lines 4-23 in column 6, for instance, i.e., "shield layer") disposed above a substrate (includes at least another portion of 10, see lines 4-23 in column 6, for instance, i.e., "base substrate"); a lower gap layer (includes at least another portion of 10, see lines 4-23 in column 6, for instance, i.e., "non-magnetic spacer"); a first ferromagnetic layer (14); a non-magnetic layer (16); a second ferromagnetic layer (18); an anti-ferromagnetic layer (20) having ion implanted regions (20a and 20b) on both ends thereof; first electrode layers (22a and 22b) disposed respectively on the regions of the anti-ferromagnetic layer; magnetic domain control layers (28a and 28b) disposed respectively on the ends of a stack of layers consisting of the first ferromagnetic layer, the non-magnetic layer, the second ferromagnetic layer, the anti-ferromagnetic layer, and the first electrode layers (as shown in FIG. 4, for instance); and second electrode layers (30a and 30b) disposed above the magnetic domain control layers (as shown in FIG. 4, for instance), wherein a width in a track width direction between the first electrode layers is smaller than a width in a track width direction of the first ferromagnetic layer (as shown in FIG. 4, for instance, i.e., the width of the first ferromagnetic layer 14 includes portions 14a, 14c and 14b) [as per claims 1 and 5]; wherein the regions of both ends of the anti-ferromagnetic layer are formed by implanting impurities into the anti-ferromagnetic material (lines 30-31 in column 8, for

instance) [as per claim 2]; wherein a width of each of the first electrode layers is 20 nm or less (lines 48-50 in column 7, for instance) [as per claim 3]; wherein the first and the second electrode layers contain one or more of elements of at least Au, Ta, W, Ru, Rh, Cu, Ti, Ag, Pt, Pd, Cr, In, Ir, Nb and Zr (lines 39-48 in column 7 and line 65 in column 9 thru line 7 in column 10, for instance, i.e., both include Ta, for instance) [as per claim 4]; wherein crystal orientation underlying layers (22a and 22b) are disposed below the magnetic domain control layers (as shown in FIG. 4, for instance) [as per claim 6]; wherein the first ferromagnetic layer is provided between the lower gap layer and the non-magnetic layer (as shown in FIG. 4, for instance), and wherein the second ferromagnetic layer is provided between the anti- ferromagnetic layer and the non-magnetic layer (as shown in FIG. 4, for instance) [as per claim 17]; wherein the first ferromagnetic layer is a free layer (lines 35-36 in column 5, for instance), and wherein the second ferromagnetic layer is in contact with the anti-ferromagnetic layer (as shown in FIG. 4, for instance) [as per claim 18].

Han, however, does not explicitly state that the ion implanted regions of the anti-ferromagnetic layer are "non-magnetic" as per claim 1-6 and 17-18; that the composite magnetic head further comprises "an upper gap layer disposed above the second electrode layers and the stack of layers; an upper magnetic shield disposed above the upper gap layer; and an inductive magnetic head disposed above the magnetoresistive head via an insulation layer" as per claims 1-6 and 17-18; and further that the composite magnetic head further comprises "soft magnetic layers ... disposed between the magnetic domain control layers and the second electrode layers" as per claim 5.

Han does however teach that pinned layer ion implanted regions (18a and 18b), which directly correspond to the ion implanted regions of the anti-ferromagnetic layer, are transformed into non-magnetic regions (lines 50-60 in column 8, for instance). Han also teaches application of the invention in a magnetic read/write head (lines 30-36 in column 1, for instance). Official notice is taken of the fact that is notoriously old and well known in the art to have a composite magnetic head further comprise an upper gap layer disposed above electrode layers and a stack of layers and an upper magnetic shield disposed above the upper gap layer in the same field of endeavor for the purpose of protecting the head from stray flux. Official notice is also taken of the fact that it is notoriously old and well known in the art to have a composite magnetic head further comprise an inductive magnetic head disposed above a magnetoresistive head via an insulation layer in the same field of endeavor for the purpose of enabling information storage. Official notice is lastly taken of the fact that it is notoriously old and well known in the art to have a composite magnetic head further comprise soft magnetic layers disposed between magnetic domain control layers and electrode layers in the same field of endeavor for the purpose of increasing stability. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have had the ion implanted regions of the anti-ferromagnetic layer of Han be non-magnetic; to have had the composite magnetic head of Han further comprise an upper gap layer disposed above the second electrode layers and the stack of layers; and an upper magnetic shield disposed above the upper gap layer; to have had the composite magnetic head of Han further comprise an inductive magnetic head disposed above the

magnetoresistive head via an insulation layer; and to have had the composite magnetic head of Han further comprise soft magnetic layers disposed between the magnetic domain control layers and the second electrode layers. The rationale is as follows:

One of ordinary skill in the art would have been motivated to have had the ion implanted regions of the anti-ferromagnetic layer of Han be non-magnetic since a person of ordinary skill in the art would have realized that there is no need to maintain magnetism in the ion implanted regions of the anti-ferromagnetic layer since the pinned layer ion implanted regions, which directly correspond to the ion implanted regions of the anti-ferromagnetic layer, are transformed into non-magnetic regions, i.e., those regions of the pinned layer no longer require pinning by the anti-ferromagnetic layer.

One of ordinary skill in the art would have been motivated to have had the composite magnetic head of Han further comprise an upper gap layer disposed above the second electrode layers and the stack of layers; and an upper magnetic shield disposed above the upper gap layer since such protects the head from stray flux.

One of ordinary skill in the art would have been motivated to have had the composite magnetic head of Han further comprise an inductive magnetic head disposed above the magnetoresistive head via an insulation layer since such enables information storage, and since Han teaches application of the invention in a magnetic read/write head.

One of ordinary skill in the art would have been motivated to have had the composite magnetic head of Han further comprise soft magnetic layers disposed

between the magnetic domain control layers and the second electrode layers since such increases stability.

Response to Arguments

5. Applicant's arguments filed 23 February 2007 have been fully considered but they are not persuasive.

The applicant argues that "the Han patent does not teach or suggest that cap layers 22a, 22b are disposed on non-magnetic regions of the anti-ferromagnetic layer" (emphasis added by applicant). This argument, however, is not found to be persuasive as Han teaches layers (22a and 22b) are disposed on ion implanted regions (20a and 20b) of anti-ferromagnetic layer (20). One of ordinary skill in the art would have been motivated to have had the ion implanted regions of the anti-ferromagnetic layer of Han be non-magnetic since a person of ordinary skill in the art would have realized that there is no need to maintain magnetism in the ion implanted regions of the anti-ferromagnetic layer since pinned layer ion implanted regions (18a and 18b), which directly correspond to the ion implanted regions of the anti-ferromagnetic layer, are transformed into non-magnetic regions (lines 50-60 in column 8, for instance), i.e., those regions of the pinned layer no longer require pinning by the anti-ferromagnetic layer.

The applicant further contends that "the Han patent lacks any teaching that describes the ion implanted portions of the magnetic pinning layer 20a and 20b of magnetic pinning layer 20 (the alleged anti-ferromagnetic layer in the Han patent) as non-magnetic regions." This argument, however, is not found to be persuasive because

of the following: Han teaches that magnetic pinning layer (20) is an anti-ferromagnetic layer in lines 16-36 in column 7, for instance. The anti-ferromagnetic layer of Han has ion implanted regions (20a and 20b) on both ends thereof. Han also teaches that pinned layer ion implanted regions (18a and 18b), which directly correspond to the ion implanted regions of the anti-ferromagnetic layer, are transformed into non-magnetic regions (lines 50-60 in column 8, for instance). One of ordinary skill in the art would have been motivated to have had the ion implanted regions of the anti-ferromagnetic layer of Han be non-magnetic since a person of ordinary skill in the art would have realized that there is no need to maintain magnetism in the ion implanted regions of the anti-ferromagnetic layer since the pinned layer ion implanted regions, which directly correspond to the ion implanted regions of the anti-ferromagnetic layer, are transformed into non-magnetic regions, i.e., those regions of the pinned layer no longer require pinning by the anti-ferromagnetic layer.

The applicant lastly asserts "the Han patent fails to teach or suggest: ... magnetic domain control layers disposed respectively on the ends of a stack of layers consisting of the first ferromagnetic layer, the non-magnetic layer, the second ferromagnetic layer, the anti-ferromagnetic layer, and the first electrode layers... as recited in independent claim 1." This argument, however, is not found to be persuasive as Han does teach magnetic domain control layers (28a and 28b) disposed respectively on ends of a stack of layers consisting of a first ferromagnetic layer (14), a non-magnetic layer (16), a second ferromagnetic layer (18), an anti-ferromagnetic layer (20), and first electrode layers (22a and 22b, as shown in FIG. 4, for instance). Note that the term "end" can be

broadly construed to mean a point that marks the extent of something. In this instance, the magnetic domain control layers are disposed respectively on points that mark the extent of the stack.

Conclusion

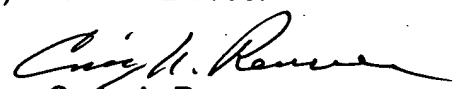
6. All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig A. Renner whose telephone number is (571) 272-7580. The examiner can normally be reached on Tuesday-Friday 9:00 AM - 7:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T. Nguyen can be reached on (571) 272-7579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Craig A. Renner
Primary Examiner
Art Unit 2627

CAR